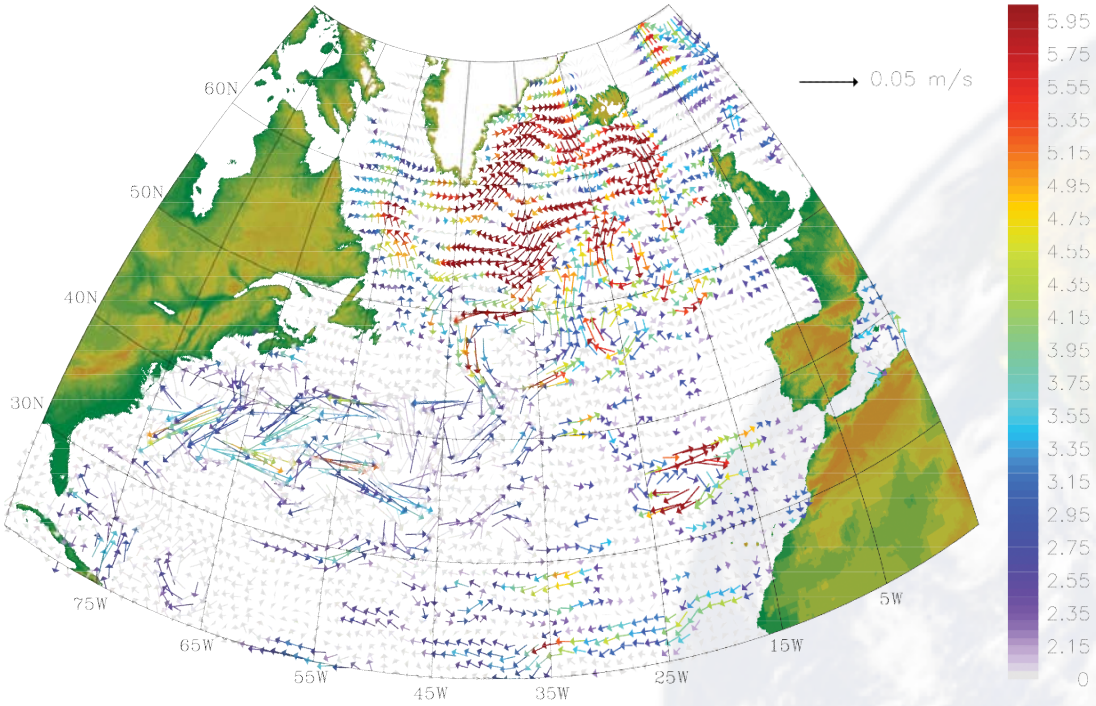
AQUARIUS highlights

Spin-down of North Atlantic Sub-polar Gyre



Satellite Fields Indicate a Distinct Trend Since the Early 1990's.

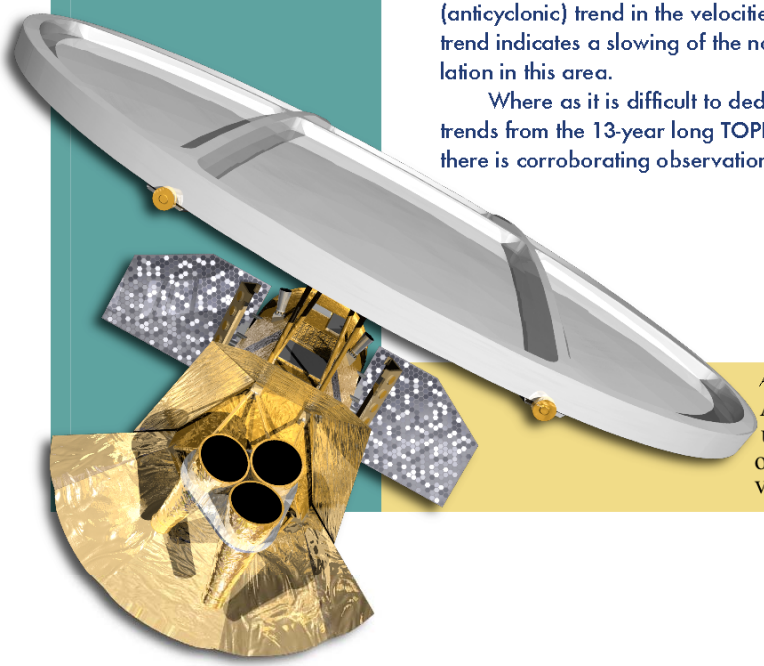
The maintenance of the North Atlantic Current circulation system depends on a fine balance between the thermal and salinity fields. Warm waters are transported northward in shallow layers near the surface and cooled at higher latitudes where they sink and head southward at depth as part of the global conveyor belt.

The figure above shows the trends during the 1990's in the surface geostrophic velocities as derived from sea-surface height retrievals from the TOPEX/Poseidon satellite. Note the area north of 50°N with red arrows. This area is part of the sub-polar gyre circulation and there is a clear clockwise (anticyclonic) trend in the velocities. This clockwise trend indicates a slowing of the normal general circulation in this area.

Where as it is difficult to deduce long term trends from the 13-year long TOPEX series alone, there is corroborating observational evidence from ice drift data dating back to 1979 that shows the sub-polar gyre circulation reached a maximum during the early 1990's and decayed in intensity through the remainder of the decade.

The convection at high latitudes necessary for the maintenance of the sub-polar gyre is critically dependent on salinity variability. The weak thermal stratification there usually means that surface salinity is critical to this convection. AQUARIUS measurements will be crucial to understanding and monitoring changes in this area that is so important to the earth's climate system.

This research is sponsored by the Physical Oceanography program at NASA HQ. Sirpa Häkkinen is the Principal Investigator for this project.



Find more information on AQUARIUS at:
http://aquarius.gsfc.nasa.gov

AQUARIUS is a joint U.S. (NASA)/Argentine (Comisión Nacional de Actividades Espaciales [CONAE]) venture. The mission will help to understand the climatic interactions between the global water cycle and ocean circulation by systematically mapping the spatial and temporal variations of sea-surface salinity.